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Smart Irrigation System using Arduino

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Abstract:-India has been considered the main source of agricultural work in the country. In India, water is required for agriculture and growing crops. There will be irrigation in the fields. So grains will be produced in the fields. Water is the main source of human life of all living beings. Grains do not grow without water. Due to the population, farming produces grains. All living beings get life only from grains. Today we can trace irrigation system. Soil moisture, ph, concentrated parameter measured. And display water level, temperature humidity through LCD display. Can see the irrigation of water through computer. With smart irrigation system, we can control the water. And can do farming easily.

Keywords:- Arduino Uno, sensors (light, Temperature, Soil Moisture, PH, Water Level, DHT 11, Humidity), LCD Display Moter pump, Exhaust Fan, GSM Module

1. Introduction:-India has been considered important for agriculture due to the increase in population in the country. We get foot grains by farming. Water is required for farming. The living being cannot survive without food grains. Today we are using iot to control water and for irrigation. Water should be added in equal quantity. Too much watering will damage the crops. Using this technology in programming IOT, python. Irrigation in water tank and river is used to irrigate the fields. In this soil moisture, water motor lcd display. Gsm module, water level humidity DHT 11 etc. Are being used.

2. Literature Review:-

Archana and Priya (2016) proposed a paper in which the humidity and soil moisture sensors are placed in the root zone of the plant. Based on the sensed values the microcontroller is used to control the supply of water to the field. This system doesn't intimate the farmer about the field status.

Sonali D.Gainwar and Dinesh V. Rojatkar (2015) proposed a paper in which soil parameters such as pH, humidity, moisture and temperature are measured for getting high yield from soil. This system is fully automated which turns the motor pump ON/OFF as per the level of moisture in the soil. The current field status is not intimated to the farmer.

V. R. Balaji and M. Sudha (2016) proposed a paper in which the system derives power from sunlight though photo-voltaic cells .This system doesn't depend on electricity. The soil moisture sensor has been used and based on the sensed values PIC microcontroller is used to ON/OFF the motor pump. Weather forecasting is not included in this system.

R.Subalakshmi (2016) proposed a paper to make irrigation system simpler, the complexities involved in irrigation is tackled with automation system using microcontroller and GSM. Based on the sensed values from soil moisture, temperature and humidity sensors, the GSM sends message to the farmer when these parameters exceed the threshold value set in the program. The nutrient content in the soil is not determined by this system.

Karan kansara (2015) proposed an automated irrigation system where the humidity and temperature sensors are used to sense the soil conditions and based on that microcontroller will control the water flow. Farmer will be intimated through GSM. This system doesn't monitor the nutrient content in the soil.

Prof C.H.Chavan and P.V.Karnade (2014) proposed a smart wireless sensor network for monitoring environmental parameters using Zigbee. These nodes send data wirelessly to a central server, which collects data, stores it and allows it to be analyzed then displayed as needed and also be sent to the client mobile. Weather forecasting and nutrient content is not determined in this system.

G.Parameswaran and K.Sivaprasath (2016) proposed a smart drip irrigation system using IOT in which humidity, temperature and pH sensors are used. Irrigation status is updated to the server or local host using personal computer. The farmer can't access about the field condition without internet.

S.Reshma and B.A.Sarath (2016) proposed an IOT based automatic irrigation system using wireless sensor networks in which various sensors are used to measure the soil parameters. This system provides a web interface to the user to monitor and control the system remotely. Weather monitoring is not done in this system.

Joaquin Gutierrez (2013) proposed a gateway unit which handles sensor information, triggers actuators, and transmits data to web application. It is powered by photovoltaic panels and has duplex communication link based on cellular internet interface that allows for data inspection and irrigation scheduling to be programmed through web page.

Yunseop kim (2008) proposed a paper in which the field conditions were site-specifically monitored by six in-field sensor stations distributed across the field. The GPS and wireless communication has been used to intimate the farmer. Without internet the farmer cannot access the information about the current field status.

Thilina N Balasooriya, Pranav Mantri, and Piyumika Suriyampola focused on IOT-based smart watering systems for improving the efficiency of agricultural irrigation. By monitoring the soil moisture of crops and also the PH level of the irrigation water, not only can water be conserved, but healthier plants can even be cultivated. This research proposes an IoT-based smart watering that addresses both of those concerns by using PH and soil microcontrollers. The IBSWS prototype demonstrates that the employment of sensors and Wi-Fi-enabled microcontrollers over a cloud environment are often accustomed implement such a system and properly managing crop irrigation.

Fei Yuan, Yifan Huang, Xin Chen proposed, a Biological Sensor System Using Computer Vision for Water Quality Monitoring. Pollution has seriously threatened our life, so a good water quality monitoring mechanism is the most Significant part of water quality management. Most studies use biological monitoring methods to watch water pollutants, like pesticides, heavy metals, and organic pollutants. However, there are still many difficulties at this time. Few methods consider the influence of illumination and complicated background within the monitoring environment, and therefore the characteristics parameters extracted within the systems are single. Additionally, the results of using shallow neural networks for water quality classification are often not ideal. so as to resolve the above problems, we design a water quality monitoring system combined with the pc image processing technology and use computer vision to investigate the fish behavior in real-time for monitoring the existence or not of pollution. For the illumination problem, we use the no-reference quality assessment algorithm supported by natural scene statistics for contrast distortion images to judge the video and configure the lighting conditions of the monitoring environment. White balance pre - processing is additionally performed to produce an excellent basis for moving target detection. Besides, we use background modeling to eliminate the influence of complex background on the moving target detection and therefore the foreground is extracted using the saliency detection algorithm. To comprehensively analyze the influence of water quality on the fish behavior from the extracted foreground targets, multi-dimensional feature parameters are wont to quantify the indications, including movement velocity, rotation angle, spatial variance, and body color which characterize the behavior changes of the fish. Finally, the classification model supported by the long memory neural network is employed to classify the feature parameters data of the fish behavior in several water quality environments.

Manish Kumar Jha, Rajini Kumari Sah, M. as proposed a smart water monitoring system for real-time water quality and usage monitoring. This paper consists of two parts: smart water quantity meter and smart water quality meter. the target of designing SMQM is to make sure conservation by monitoring the quantity of water consumed by a household, notifying the identical to the buyer and also the authority

The new scenario of decreasing water, drying up of rivers and tanks, unpredictable environment, present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture, sensors are placed at suitable locations for monitoring the crops. After research in the agricultural field, researchers found that the yield of agriculture is decreasing day by day. However, use of technology in the field of agriculture plays an important role in increasing the production as well as in reducing the man power. Some of the research attempts are done for betterment of farmers that provide systems which use technologies helpful for increasing the agricultural yield. By using IoT sensors sense data from agricultural field and accurately feed the data into the repositories. This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigation system through wireless communication technology. It acquire the soil moisture, Humidity, temperature from various locations of field and as per the need of crop water motor is enabled.

3. Diagram:-

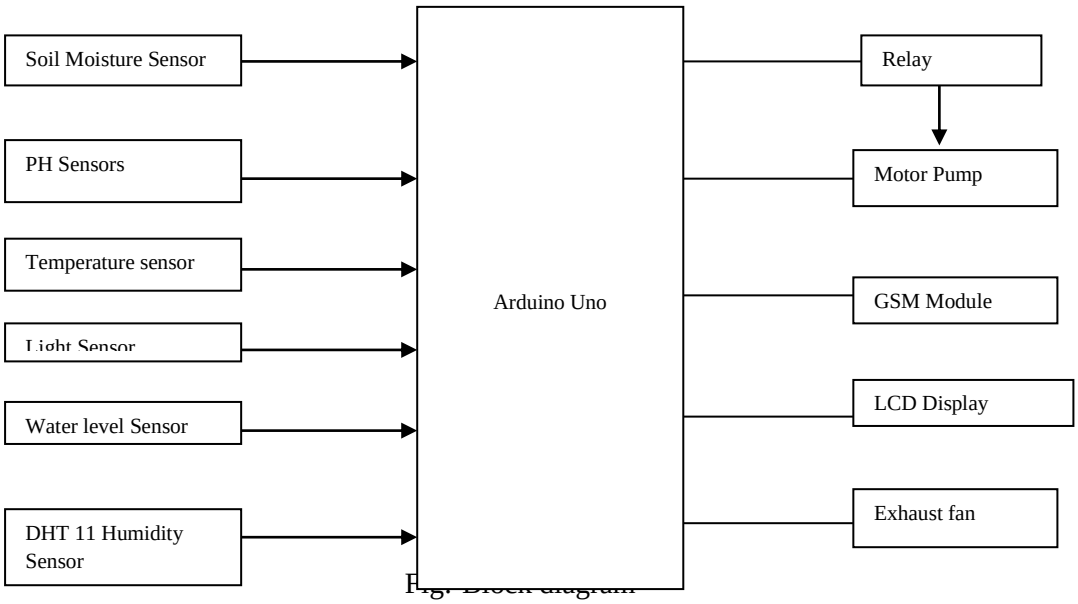

Fig. Block diagram

4. Proposed System:-

To control water and for irrigation, six sensors such as water level, soil moisture, level, Temperature, DHT11 Humidity. PH sensor etc. Are used. ,otor pump has been installed to irrigate the field and lcd dispalay has been insatalled to detect the irrigation water. And the quantity of waqter can be seen form the lcd screen . in GSM module, GSM digtal computer network has been to known the irrigation of crops. If there is moisture in the soil in the fields than the crop will be goods. The harvest will good. Then you will get grains. The amount of water in fields should be equal. The more water. Or there will be crop lass and disease may also occur. Therefore, water controller has been used to increase or decrease the water. Relay is used to switch on off the water motor pump. Today we can do irrigation through smart irrigation system. To run the program the device has to be connected. When the hardware runs. The output appears in the display of the software.

1. Arduino UNO:-

The Microcontroller used here is an Arduino UNO. The UNO is a Microcontroller board based on ATMEGA 328P. The ATMEGA 328P has 32kB of flash memory for storing code. The board has 14 digital input and output pins, 6 analogy inputs, 16 MHz quartz crystal, USB, an ICSP circuit and a reset button. The UNO can be programmed with the Arduino software.

2. Sensors:-

1. Hardware Specification:-

(a) Soil Moisture Sensor:-

Soil Moisture sensor is used to measure the moisture content present in the soil. When the soil moisture value read by the sensor is above the threshold value, low level (0V) will be the digital output and if it is below the threshold level, high level (5V) will be the digital output. The digital pin is used to directly read current soil moisture value to see if it is above threshold or not. The threshold voltage can be regulated with help of potentiometer.

(b) PH Sensor:-

PH is the measure of acidity or alkalinity of water solution which is determined by the relative number of hydrogen (H+) or hydroxyl (OH-) ions present. The pH value (below 7) is said to be acidic and (above 7) is said to be basic. The pH of a solution can change with temperature respectively.

(c) DHT 11 Sensor:-

DHT11 sensor is used for measuring temperature and humidity. It uses a capacitive humidity sensor and a thermostat to measure the surrounding air. This sensor is cost effective, provides low power consumption and up-to 20 meter signal transmission is possible.

(d) Temperature Sensor:-

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 doesn't require any external calibration or trimming to provide typical accuracies.

Features:-

Calibrated directly at ° Celsius (Centigrade)

1. Linear + 10.0 mV/°C scale factor

2. 0.5°C accuracy guarantee able (at +25°C)

3. Rated for full −55° to +150°C range

4. Suitable for remote applications

5. Low cost due to wafer-level trimming

6. Less than 60µA current drain

7. Operates from 4 to 30 volts

8. Low self -heating, 0.08°C in still air

9. Low impedance output, 0.1 W for 1 mA load.

(e) Light sensor:-

The light sensor is a passive device that converts the light energy into an electrical signal output. Light sensors are more commonly known as Photoelectric Devices or Photo Sensors because they convert light energy (photons) into electronic signal (electrons). Phototransistors, photo resistors, and photodiodes are some of the more common type of light intensity sensors.

(f) Water Level Sensor:-

The water level sensor is a device that measures the liquid level in a fixed container that is too high or too low. According to the method of measuring the liquid level, it can be divided into two types: contact type and non-contact type. The input type water level transmitter we call is a contact measurement, which converts the height of the liquid level into an electrical signal for output. It is currently a widely used water level transmitter.

2. Motor Pump:-

A Water Motor is used for agricultural irrigation. The amount of Water required for th crop in the field is more. Boring is needed for more irrigation in the fields. Difficult to get off the ground. The depth of the water closes. Today, water crisis is more in the fields. The level from which the water fells down for that, a motor is required to pump out the water at high speed. Low-power motors do not go very deep.

4. Relay:- :-Relays is an electrical switch.one or more keys are switched on or off with the help of an electromagnet. A relay can also be considered a generalized power amplifier because lower power circuit is used to control a higher power circuit is used to control a higher power circuit. The contractor also works on relay but is often used to switch on/off the contract with a current of more than 15 amps.

5. GSM Module:-

GSM (Global System for Mobile Communication) is a standard developed by the European Telecommunication Standards Institute (ETSI) to describe protocols for second-generations (2G) digital cellular networks used by mobile phones. GSM describes a digital, circuit-switched network optimized for full duplex voice telephony and also expanded to include data communications, packet data transport via GPRS (General Packet Radio Services). The longest distance the GSM specification supports in practical is 35 kilometres (22mi).

4. LCD Display:-

The Liquid Crystal library allows you to control LCD displays that are compatible with the Hitachi HD44780 driver. There are many of them out there, and you can usually tell them by the 16-pin interface.

5. Exhaust fan:-

As stated, exhaust fans work by removing unwanted odors, moisture, smoke and other pollutants in the air. When steam and moisture are in the air, it can cause mold to develop. When you utilize an exhaust fan, the steam is released outside, which helps you control mold in your home. Exhaust fans are also help keep your furniture and other belongings safe and in great condition.

2. Software Specification:-

Python is an interpreted high-level programming language for general -purpose programming. Created by Guido van Rossum and first related in 1991.

5. Result and Discussion:-

With rapid increase in agriculture, farmers are very much in need of the outside machineries to run their farm without any distraction in the middle, without any water scarcity. This work will help farmers to reserve the water for later use, though the scarcity of the water is there in that region also by following this technique water could be sufficient for growing plants. Sensors are used to detect the water level. Proper planning and necessary machines which is of low cost has to be used which benefits the farmers. But the limitation of this work is, it is used only for small farms because sensors whatever is been used will detect the moisture level for certain distance or for certain area. If we want to detect for more areas one has to use more number of sensors and the reservoir for storing of water. Future more sensors enabled in one board can be developed to place it in an area and a bigger reservoir to

collect the water and motor pump capacity which is of higher voltage can be used such that water can be pumped throughout the farms in a better and efficient manner.

6. Conclusion:-

Smart Irrigation System is a objective make it more innovate user friendly, time saving and more efficient than the existing System. It has five measure, Water level, DHT11 humidity, Temperature, Soil Moisture, etc. Water used for Irrigation and to control water. With this, farmers can do farming. Know about can know natural. IOT for farming has a big impact on smart farming. In this, GSM module, LCD Display and motor connects output, soil moisture and humidity sensor etc. have been used with Arduino. Water is produced in this. Farming is done with water. In Arduino UNO, Motor pump work as output device.

Sensors	Sensor value range
Soil Moisture	-10dC to +85dC
Pressure	+-102mmH2O
DHT11	Temp -55dC to +150dC Humidity 40 percent
PH Sensor	6.5 to 7.5

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